REMARKS

Claims 1 and 4 are currently pending. By this amendment claim 1 is amended. Support for the amendments is found in the specification, including the claims, as filed. No new matter has been introduced. Favorable reconsideration of the application in light of the following comments is respectfully solicited.

In section 3 of the Office Action, claims 1 and 4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese Patent App. Pub. No. H11-354143 (Saito) in view of U.S. Patent App. Pub. No. 2004/0038098 (Imamura), U.S. Patent App. Pub. No. 2004/0137285 (Meltser), and U.S. Patent App. Pub. No. 2004/0197614 (Simpson). Applicants respectfully traverse.

1. The cited art does not make obvious a fuel cell system that "always satisfies the relation" recited in claim 1

On pages 5-6 of the previous Response, Applicants noted

> In order to satisfy the relationship "$0 < \Delta Po \times \Delta Pp$," ΔPo and ΔPp must either (1) both be greater than zero, or (2) both be less than zero. In other words, during operation and the purge operation, the pressure of one of the anode side and the cathode side of the electrolytic membrane is controlled so that it is constantly larger than the pressure of the other side, avoiding reversal of the relation of Pa and Pc (*i.e.*, which one is greater).
>
> . . .
>
> Neither Saito not Imamura disclose preventing a reversal of the relation between Pa and Pc.
>
> . . .
>
> Meltser does not cure the above shortcoming, as it does not disclose preventing a reversal of the relation between Pa and Pc.

Applicants further stated that

> the Office Action incorrectly asserts at page 4, lines 17-19 and page 5, lines 16-18 that, that in view of Imamura one of ordinary skill in the art would understand $Pa > Pc$, such that ΔPo or ΔPp "**must** be greater than 0 (zero)." Instead, as noted

above, Imamura discloses the use of *both* positive and negative ΔP values. The Office Action appears to acknowledge Applicants' statement, as page 8 of the Office Action now merely states "ΔP_o **can** be greater than 0 . . . and because ΔP_o **can** be greater than 0 (zero) . . . the product of ΔP_o and ΔP_p **can** be greater than 0 (zero)" (*emphasis added*). In other words, the Office Action does not dispute that avoiding reversal of the relation of Pa and Pc is nonobvious in view of the cited art, but instead that the proposed combination of references would yield a device that sometimes satisfies the relationship "$0 < \Delta Po \times \Delta Pp$."

However, amended claim 1 recites, *inter alia*,

> the differential pressure during operation ΔPo and the differential pressure during the purge operation ΔPp **always** satisfy the relations: $0 < \Delta Po \times \Delta Pp$ and $| \Delta Pp | \leq | \Delta Po |$.

For the reasons discussed in the previous Response, avoiding reversal of the relation of Pa and Pc is nonobvious in view of the cited art. As claim 1 recites that the recited relationship is always satisfied for "the differential pressure during operation ΔPo and the differential pressure during the purge operation ΔPp," the combination of references proposed by the Office Action that merely "can" sometimes satisfy the recited relations does not make claim 1 obvious. Accordingly, Applicants respectfully request withdrawal of the rejection of independent claim 1 and dependent claim 4.

2. Simpson does not disclose or suggest "means for variably controlling the flow rate of the inert gas supplied to said fuel cell"

Claim 1 recites, *inter alia*, "means for variably controlling the flow rate of the inert gas supplied to said fuel cell." The Office Action acknowledges that the proposed combination of Saito, Imamura, and Meltser does not make the above limitation obvious. Office Action, page 6, lines 4-5 ("Modified Saito fails to teach a means for variably controlling the flow rate of the purge gas."). Attempting to bridge this acknowledged gap between claim 1 and the cited art, the

Office Action asserts that Simpson "teaches . . . a means for variably controlling the flow rate of the purge gas (72, paragraphs [0045], [0049]-[0050], & [0039]; Figure 1)" (Office Action, page 6, lines 6-9). The cited portions, as well as ¶ [0024] (which describes reference numeral 72), of Simpson disclose:

- [0024]: "A purge control device 72 is disposed in the hydrogen purge line 70 to purge a portion of the anode exhaust out of the recirculation line 60."
- [0045]: "a cathode purge line 54 branches out from the recirculation line 40 at a branch point 53 adjacent the cathode outlet of the fuel cell 12 and a cathode purge means 52 is provided for the cathode exhaust stream in the cathode purge line 54. Similar to the purge control device 72, the cathode purge means 52 can be a valve or other suitable devices. . . . the back pressure in the oxidant supply line 30 can be continuously varied by opening the purge means 52 to different extents."
- [0049]: "When the rate at which the load current changes is beyond a certain level, or the load 200 current itself has changed beyond a certain level, the controller 300 controls the purge means 52 to open."

However, with reference to the limitations recited in claim 1, Simpson does not disclose or suggest "means for variably controlling the flow rate of the <u>inert gas</u> <u>supplied</u> to said fuel cell." First, neither 52 nor 72 relates to an "inert gas," as purge control device 72 controls a flow of exhausted hydrogen, and cathode purge line 54 controls a flow of exhausted oxidant, such as air. Second, neither 52 nor 72 controls a flow rate "supplied to said fuel cell." Instead, both 52 and 72 control flow rates on the exhaust side of the fuel cell.

Thus, as Simpson fails to bridge the above acknowledged gap between claim 1 and the cited art, the cited art cannot sustain prima facie case of obviousness against claim 1. Accordingly, Applicants respectfully request withdrawal of the rejections of claims 1 and 4.

3. Meltser does not relate to "a purge operation," as recited

Claim 1 recites, *inter alia*,

> said fuel cell being subjected to a <u>purge operation of replacing the fuel gas and/or oxidant gas in said fuel cell with the inert gas</u> supplied from said inert gas supply means <u>when said fuel cell is started up or shut down</u>.

Meltser discloses that "purging is done by opening the anode side and allowing the anode effluent to flow out of the fuel cell stack while new fuel, under pressure, is supplied to the anode side inlet" (paragraph [0005]) (*emphasis added*). The "purging" disclosed by Meltser is performed as part of ongoing operation to free the membrane from accumulated nitrogen (*see* paragraph [0005]), which is entirely different from "a purge operation . . . when said fuel cell is started up or shut down," as recited in claim 1. Thus, the assertion on page 4 of the Office Action that "Meltser teaches the concept of controlling the pressure differential between the anode and the cathode of a fuel cell during purging operation" is incorrect, as the "purging" disclosed by Meltser does not correspond to "a purge operation" as recited in the claims. Thus, the asserted factual basis for obviousness of claim 1 in view of the cited art is incorrect. Accordingly, Applicants respectfully request withdrawal of the rejections of independent claim 1 and dependent claim 4.

4. The Office Action is not responsive to the argument beginning at page 7, line 18 of the Response filed on April 2, 2008

The Office Action, beginning on page 8, asserts

> Applicant's argument on pages 7-8 of the Applicant's Response . . . is moot because Meltser et al. is no longer used to reject this limitation due to the added limitation of a means for changing the internal diameter of an outlet-side flow path of an exhaust gas from said fuel cell at least in stages based on the values of Pa and Pc during the purge operation of said fuel cell."
> (*emphasis added*)

Applicants respectfully note that the above language describing an "added limitation" comes from dependent claim 4, which recites, *inter alia*,

> means for changing the internal diameter of an outlet-side flow path of an exhaust gas from said fuel cell at least in stages, and means for changing said internal diameter at least in stages based on the values of Pa and Pc during the purge operation of said fuel cell. (*quoted language emphasized*)

As the asserted rationale for declaring Applicant's argument, which is directed to claim 1 (not dependent claim 4), moot is based on changes to dependent claim 4, the Office Action is nonresponsive to Applicants' previous argument. Applicants find that the basis of rejection offered in the Office Action, insofar as it relates to Applicants' earlier argument, is essentially unchanged and equally deficient. Accordingly, Applicants substantively repeat the earlier argument below, and respectfully request a response thereto.

Claim 1 recites, *inter alia,*

> means for measuring a pressure **Pa in an inlet-side flow path leading to the anode** of said fuel cell and a pressure **Pc in an inlet-side flow path leading to the cathode**
> . . .
> variably **controlling the flow rate of the inert gas** supplied to said fuel cell **based on the values of Pa and Pc** during the purge operation of said fuel cell.

The Office Action asserts that reference numerals 71 and 81, illustrated in Imamura, FIG. 9, disclose the above limitations (Office Action, page 3, lines 12-17). However, Imamura does not disclose what is claimed. Although FIG. 9 discloses pressure sensors 71 (Pain), 72 (Paout), 81 (Phin), and 82 (Phout) at the inlets and outlets of the anode and cathode, Imamura does not disclose "controlling the flow rate of the inert gas . . . based on the values of [measured anode **inlet-side** pressure] Pa **and** [measured cathode **inlet-side** pressure] Pc" (*i.e.*, sensors 71 and 81, according to the Office Action). As illustrated in FIG. 10, comparisons and control operations are made on the basis of *either* (1) the combination of Phout (82) + Pain (71) (steps S221-S223) or (2) the combination of Phin (81) + Paout (72) (steps S230-S232), depending on the determination of step S220 (excess water condition). As Imamura notes that "Pain>Paout due to the ventilation resistance" (¶ [0119]) and "Phin>Phout due to the ventilation resistance" (¶ [0120]), the input and output pressure readings cannot simply be swapped. If the readings were equivalent or readily interchangeable, it would make no sense to employ sensors at all four

locations. Thus, Imamura does not disclose "controlling the flow rate of the inert gas . . . based on the values of Pa <u>and</u> Pc," where Pa and Pc are both measured on inlet sides.

Meltser, Saito, and Simpson do not cure this deficiency. In Meltser, both pressure transducers 46 and 48 are (1) *only on the anode side* of the fuel cell, and (2) *only on the outlet side* of the fuel cell (*e.g.*, "on respective . . . sides of valve 42") (*see* Meltser, ¶ [0021]). In Simpson, reference numerals 52 and 72 are both disposed on the outlet side of the fuel cell. *See* FIG. 1. Thus, Meltser and Simpson bridge the above gap between claim 1 and Imamura. Regarding Saito, the Office Action further acknowledges that Saito "fails to teach a means for measuring pressure at the inlet-side flow paths leading to the anode and the cathode" (Office Action, page 3, lines 4-5). Thus the combination of Imamura, Saito, Meltser, and Simpson proposed by the Office Action fails to make obvious "controlling the flow rate of the inert gas," as recited in claim 1. Accordingly, Applicants respectfully request withdrawal of the rejection of claims 1 and 4.

Accordingly, it is urged that the application, as now amended, is in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, Examiner is requested to call the undersigned attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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